



(11)

EP 2 407 658 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
17.12.2014 Bulletin 2014/51

(51) Int Cl.:
F02F 1/00 (2006.01) *F02F 7/00* (2006.01)

(43) Date of publication A2:
18.01.2012 Bulletin 2012/03

(21) Application number: 11173684.9

(22) Date of filing: 12.07.2011

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(30) Priority: 15.07.2010 JP 2010160684
21.07.2010 JP 2010164294

(71) Applicant: **Suzuki Motor Corporation**
Shizuoka-ken 432-8611 (JP)

(72) Inventors:

- Mori, Masaki**
Shizuoka-Ken, 432-8611 (JP)
- Oda, Tomoyuki**
Shizuoka-Ken, 432-8611 (JP)

(74) Representative: **Höhfeld, Jochen**
Klunker Schmitt-Nilson Hirsch
Patentanwälte
Destouchesstrasse 68
80796 München (DE)

(54) Multi-cylinder engine

(57) A multi-cylinder engine is provided with a crankcase integrated cylinder block which includes a cylinder block including a plurality of cylinder bores, a plurality of crank chambers formed by an upper crankcase and a lower crankcase, a bulkhead that partitions between the cylinder bores and the crank chambers, and a honing release portion having a cylindrical honing release surface formed continuously with the cylinder bore in the upper crankcase and the bulkhead. The honing release surface forms an arcuate recessed portion in the bulkhead, the bulkhead is formed with a communication hole that includes a first opening edge on a side of the cylinder bore, a second opening edge on a side of the crank chamber having an opening width decreasing with a distance from the cylinder bore, and a third opening edge that extends substantially in parallel with the cylinder axis, the communication hole being formed from the cylinder bore to the recessed portion so as to establish communication between the cylinder bores and the crank chambers, and the second opening edge is formed from the cylinder bore to the recessed portion to prevent the honing release surface from being divided.

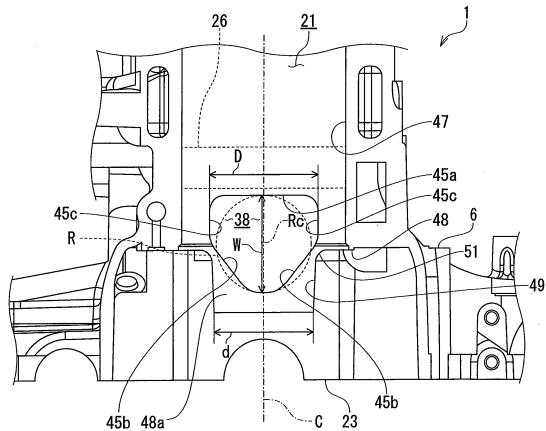


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 11 17 3684

DOCUMENTS CONSIDERED TO BE RELEVANT									
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)						
10	X, D US 2005/045121 A1 (KAWAMOTO YUICHI [JP] ET AL) 3 March 2005 (2005-03-03) * paragraphs [0004], [0005], [0006], [0010], [0016]; figure 3 *	1-3	INV. F02F1/00 F02F7/00						
15	X, D & JP 2005 069170 A (KAWASAKI HEAVY IND LTD) 17 March 2005 (2005-03-17) * the whole document *	1-3							
20	A US 5 909 721 A (IKEGAYA HIROHIKO [JP]) 8 June 1999 (1999-06-08) * the whole document *	1,4							
25	A JP 2004 316556 A (RYOBI LTD; HONDA MOTOR CO LTD) 11 November 2004 (2004-11-11) * figures 3,4 *	1,4							
30	A US 2008/092845 A1 (YONEYAMA MASAKI [JP] ET AL) 24 April 2008 (2008-04-24) * abstract; figures *	1,4							
35	A US 2003/041834 A1 (KAWAKUBO HIROYUKI [JP] ET AL) 6 March 2003 (2003-03-06) * abstract; figures *	1,4	TECHNICAL FIELDS SEARCHED (IPC)						
40			F02F						
45									
50	The present search report has been drawn up for all claims								
55	<table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>Munich</td> <td>11 November 2014</td> <td>Coniglio, Carlo</td> </tr> </table>			Place of search	Date of completion of the search	Examiner	Munich	11 November 2014	Coniglio, Carlo
Place of search	Date of completion of the search	Examiner							
Munich	11 November 2014	Coniglio, Carlo							
<p>3 EPO FORM 1503 03.82 (P04C01)</p> <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>.....</p> <p>& : member of the same patent family, corresponding document</p>									

5
**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 17 3684

10
 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
 The members are as contained in the European Patent Office EDP file on
 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-11-2014

	Patent document cited in search report		Publication date	Patent family member(s)		Publication date
15	US 2005045121	A1	03-03-2005	JP 2005069170 A		17-03-2005
				US 2005045121	A1	03-03-2005

20	US 5909721	A	08-06-1999	EP 0733792 A2		25-09-1996
				JP 3502689 B2		02-03-2004
				JP H08261055 A		08-10-1996
				US 5806481 A		15-09-1998
				US 5909721 A		08-06-1999

25	JP 2004316556	A	11-11-2004	NONE		

30	US 2008092845	A1	24-04-2008	NONE		

35	US 2003041834	A1	06-03-2003	DE 60214098 T2		21-12-2006
				EP 1288477 A2		05-03-2003
				JP 2003074408 A		12-03-2003
				US 2003041834 A1		06-03-2003

40						
45						
50						
55	-----					
	EPO FORM P0459					
	For more details about this annex : see Official Journal of the European Patent Office, No. 12/82					